CLAIMS

What is claimed is:

1. A circuit board module, comprising:

a circuit board having a component mounting location;

a circuit board component mounted to the component mounting location of the circuit board, the circuit board component including:

a substrate having non-conductive material and conductive material supported by the non-conductive material, the conductive material defining (i) a circuit board interface, (ii) a die interface, (iii) a heat spreader interface, and (iv) a set of connections which interconnects the circuit board interface, the die interface and the heat spreader interface,

a die coupled to the die interface defined by the conductive material of the substrate, the die including integrated circuitry which is configured to electrically communicate with a circuit board when the circuit board couples to the circuit board interface defined by the conductive material of the substrate, and

a heat spreader coupled to the heat spreader interface defined by the conductive material of the substrate, the heat spreader being configured to dissipate heat from the die, the heat spreader in combination with the heat spreader interface forming an electromagnetic interference shield when a portion of the circuit board interface connects to a ground reference of the circuit board through the circuit board interface; and

a heat sink in thermal communication with the heat spreader of the circuit board component.

2. The circuit board module of claim 1 wherein the heat spreader interface defined by the conductive material of the substrate of the circuit board component includes:

a conductive ground plane disposed along a flat surface of the substrate, the conductive ground plane completely encircling the die interface in a 360 degree manner to minimize escape of electromagnetic interface from the die during operation of the integrated circuitry.

3. The circuit board module of claim 1 wherein the heat spreader interface defined by the conductive material of the substrate of the circuit board component includes:

conductive ground plates disposed along a flat surface of the substrate, the conductive ground plates encircling the die interface in a 360 degree manner to minimize escape of electromagnetic interface from the die during operation of the integrated circuitry.

4. A circuit board module, comprising:

a circuit board having a component mounting location;

a circuit board component mounted to the component mounting location of the circuit board, the circuit board component including:

a heat spreader configured to dissipate heat from the circuit board component,

a substrate having non-conductive material and conductive material supported by the non-conductive material, the conductive material defining (i) a circuit board interface, (ii) a die interface, (iii) heat spreader connecting means for physically and electrically connecting to the heat spreader, and (iv) a set of connections which

interconnects the circuit board interface, the die interface and the heat spreader connecting means, wherein the heat spreader and the heat spreader connecting means form an electromagnetic interference shield when a portion of the circuit board interface connects to a ground reference of the circuit board through the circuit board interface, and

a die coupled to the die interface defined by the conductive material of the substrate, the die including integrated circuitry which is configured to electrically communicate with the circuit board when the circuit board couples to the circuit board interface defined by the conductive material of the substrate; and

a heat sink in thermal communication with the heat spreader of the circuit board component.

5. A circuit board component, comprising:

a substrate having non-conductive material and conductive material supported by the non-conductive material, the conductive material defining (i) a circuit board interface, (ii) a die interface, (iii) a heat spreader interface, and (iv) a set of connections which interconnects the circuit board interface, the die interface and the heat spreader interface;

a die coupled to the die interface defined by the conductive material of the substrate, the die including integrated circuitry which is configured to electrically communicate with a circuit board when the circuit board couples to the circuit board interface defined by the conductive material of the substrate; and

a heat spreader coupled to the heat spreader interface defined by the conductive material of the substrate, the heat spreader being configured to dissipate heat from the die, the heat spreader in combination with the heat spreader interface forming an electromagnetic interference shield when a portion

of the circuit board interface connects to a ground reference of the circuit board through the circuit board interface.

6. The circuit board component of claim 5 wherein the heat spreader interface includes:

a conductive ground plane disposed along a flat surface of the substrate, the conductive ground plane completely encircling the die interface in a 360 degree manner to minimize escape of electromagnetic interface from the die during operation of the integrated circuitry.

7. The circuit board component of claim 6 wherein the conductive ground plane of the heat spreader extends along an outer periphery of the substrate, and wherein the heat spreader interface further includes:

a conductive ground edge disposed along the outer periphery of the substrate, the conductive ground edge being contiguous with the conductive ground plane and extending from the conductive ground plane in a substantially perpendicular manner relative to the conductive ground plane to minimize escape of electromagnetic interface from the substrate during operation of the integrated circuitry.

8. The circuit board component of claim 7 wherein the heat spreader includes:

a main portion which extends along the flat surface of the substrate in a substantially parallel manner relative to the flat surface of the substrate; and

an edge portion which extends along the outer periphery of the substrate in a substantially parallel manner relative to the outer periphery of the substrate, the edge portion being contiguous with the main portion and extending from the main portion in a substantially perpendicular manner relative to the main portion.

9. The circuit board component of claim 8, further comprising:

electrically conductive material which forms an electromagnetic interference seal between the main portion of the heat spreader and the conductive ground plane of the heat spreader interface, and between the edge portion of the heat spreader and the conductive ground edge of the heat spreader interface.

10. The circuit board component of claim 5 wherein the heat spreader interface includes:

conductive ground plates disposed along a flat surface of the substrate, the conductive ground plates encircling the die interface in a 360 degree manner to minimize escape of electromagnetic interface from the die during operation of the integrated circuitry.

11. The circuit board component of claim 5, further comprising:

a ring-shaped solder joint formed from high temperature solder which forms an electromagnetic interference seal between the heat spreader and the heat spreader interface defined by the conductive material of the substrate.

12. The circuit board component of claim 5 wherein the heat spreader interface is disposed along a first flat surface of the substrate, wherein the circuit board interface is disposed along a second flat surface of the substrate, wherein the first and second flat surfaces are substantially parallel to each other, wherein the circuit board interface includes an array of pads, and wherein the circuit board component further comprises:

an array of circuit board contacts coupled to the array of pads, the array of circuit board contacts being configured to mount to an area array component mounting location of the circuit board using a surface mount technology soldering process.

13. The circuit board component of claim 12 wherein the circuit board component is an Application Specific Integrated Circuit device.

14. A circuit board component, comprising:

a heat spreader configured to dissipate heat from the circuit board component;

a substrate having non-conductive material and conductive material supported by the non-conductive material, the conductive material defining (i) a circuit board interface, (ii) a die interface, (iii) heat spreader connecting means for physically and electrically connecting to the heat spreader, and (iv) a set of connections which interconnects the circuit board interface, the die interface and the heat spreader connecting means, wherein the heat spreader and the heat spreader connecting means form an electromagnetic interference shield when a portion of the circuit board interface connects to a ground reference of a circuit board through the circuit board interface; and

a die coupled to the die interface defined by the conductive material of the substrate, the die including integrated circuitry which is configured to electrically communicate with the circuit board when the circuit board couples to the circuit board interface defined by the conductive material of the substrate.

15. The circuit board component of claim 14 wherein the heat spreader interface defined by the conductive material of the substrate includes:

a conductive ground plane disposed along a flat surface of the substrate, the conductive ground plane completely encircling the die interface in a 360 degree manner to minimize escape of electromagnetic interface from the die during operation of the integrated circuitry.

16. The circuit board component of claim 14 wherein the heat spreader interface defined by the conductive material of the substrate includes:

conductive ground plates disposed along a flat surface of the substrate, the conductive ground plates encircling the die interface in a 360 degree manner to minimize escape of electromagnetic interface from the die during operation of the integrated circuitry.

17. A method for manufacturing a circuit board component, the method comprising:

forming a substrate having non-conductive material and conductive material supported by the non-conductive material, the conductive material defining (i) a circuit board interface, (ii) a die interface, (iii) a heat spreader interface, and (iv) a set of connections which interconnects the circuit board interface, the die interface and the heat spreader interface;

coupling a die to the die interface defined by the conductive material of the substrate, the die including integrated circuitry which is configured to electrically communicate with a circuit board when the circuit board couples to the circuit board interface defined by the conductive material of the substrate; and

physically and electrically connecting a heat spreader to the heat spreader interface defined by the conductive material of the substrate, the heat spreader being configured to dissipate heat from the die, the heat spreader in combination with the heat spreader interface forming an electromagnetic interference shield when a portion of the circuit board interface connects to a ground reference of the circuit board through the circuit board interface.

18. The method of claim 17 wherein physically and electrically connecting the heat spreader to the heat spreader interface includes:

printing solder paste over the heat spreader interface, the solder paste including flux and high temperature solder;

placing the heat spreader in contact with the solder paste; and

applying heat to activate the flux and melt the high temperature solder to form a solder joint between the heat spreader and the heat spreader interface.

19. The method of claim 17 wherein physically and electrically connecting the heat spreader to the heat spreader interface includes:

printing solder paste over the heat spreader interface, the solder paste including flux and high temperature solder;

placing the heat spreader in contact with the solder paste; and

applying current through the heat spreader interface and the heat spreader to activate the flux and melt the high temperature solder to form a solder joint between the heat spreader and the heat spreader interface.

20. The method of claim 17 wherein physically and electrically connecting the heat spreader to the heat spreader interface includes:

printing solder paste over the heat spreader interface, the solder paste including flux and high temperature solder;

placing the heat spreader in contact with the solder paste; and

directing a laser over the solder paste to activate the flux and melt the high temperature solder to form a solder joint between the heat spreader and the heat spreader interface.